

**84e:58019** 58E07 34-02 58-02 58F14

**Chow, Shui Nee; Hale, Jack K.**

★**Methods of bifurcation theory.**

Grundlehren der Mathematischen Wissenschaften [Fundamental Principles of Mathematical Science], 251.

*Springer-Verlag, New York-Berlin*, 1982. xv+515 pp. \$48.00.

ISBN 0-387-90664-9

This book is an important survey on bifurcation theory. The subject is too large for a single book but the authors seem to have made a judicious choice of topics. They interpret bifurcation theory in a wide sense. For example, they discuss in some detail the existence and properties of invariant manifolds. They include results which appear to be new and give simpler proofs of many known results.

In more detail, they first discuss rather briefly some of the standard methods of nonlinear analysis including preparation theorems, transversality, degree theory and Lyusternik-Shnirelman theory and give applications. In particular, they discuss local bifurcation theory for stationary solutions, Hopf bifurcation, Rabinowitz-type global bifurcation theorems, and variational methods (including saddle point theorems). In each case, they give applications to ordinary and partial differential equations. They also discuss various bifurcations involving homoclinic orbits, bifurcation from a periodic orbit to a two-dimensional torus and bifurcations involving perturbations of the local solution structure on  $\mathbf{R}^2$ .

One important topic they discuss to a limited extent is perturbed bifurcation theory and in particular the influence of symmetries. This will be discussed in detail in a book that Golubitsky and Schaeffer are writing on the use of singularity theory in bifurcation theory.

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